



DEFENSE INFORMATION SYSTEMS AGENCY

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IN REPLY
REFER TO: Joint Interoperability Test Command (JTE)

10 Mar 16

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Joint Interoperability Certification of the Tellabs Optical Local Area Network, Gigabit Passive Optical Network, with Software Release version 29.0

References: (a) Department of Defense (DoD) Instruction (DoDI) 8100.04, "DoD Unified Capabilities (UC)," 9 December 2010
(b) Office of the Department of Defense Chief Information Officer, "Department of Defense Unified Capabilities Requirements 2013, Errata-1," 1 July 2013
(c) through (d), see Enclosure 1

1. **Certification Authority.** References (a) establish the Joint Interoperability Test Command (JITC) as the Joint Interoperability Certification Authority for the Unified Capabilities (UC) products.

2. **Conditions of Certification.** The Tellabs Optical Local Area Network (LAN) Gigabit Passive Optical Network (GPON) solution consists of an Optical Line Terminal (OLT) and an Optical Network Termination (ONT). The Tellabs OLT (1131, 1134, 1150 and 1150E), combined with an ONT (ONT120C, ONT120W, ONT140C, ONT140W, ONT728GP, and ONT729GP), and the 1000 Voice Gateway, with Software Release 29.0, hereinafter referred to as the System Under Test (SUT). The SUT meets all of the critical requirements of the Unified Capabilities Requirements (UCR), Reference (b), with the exceptions/caveats noted in Tables 1-3 of this report. This certification expires upon changes that affect interoperability, but no later than three years from the date of this memorandum.

Table 1. Conditions

Condition	Operational Impact	Remarks
UCR Waivers		
None		
Conditions of Fielding		
None		
Open Test Discrepancies		
TEL-0515-001 Auto Negotiation Link Failure at 1000Mbps, auto, Half-duplex	Minor Without POAM - COF	UCR 2013 Errata-1 Section 7.5.2.1 and 7.5.2.4
TEL-0518-001 Performance Monitoring does not monitor jitter.	Minor Without POAM - COF	UCR 2013 Errat-1 Section 7.5.14
LEGEND: COF Condition Of Fielding POAM Plan Of Action & Mitigation Mbps Megabits per second UCR Unified Capabilities		

3. **Interoperability Status.** Table 2 provides the SUT interface interoperability status. Table 3 provides the Capability Requirements and Functional Requirements status. Table 4 provides a UC Approved Products List product summary.

Table 2. SUT Interface Status

Interface	Applicability (R), (O), (C)	Status	Notes
NNI Interfaces			
100Base-T	O	Met	None
100Base-FX	O	Met	See note 1.
1000Base-T	O	Met	None
1000BaseX	O	Met	None
OLT to ONT PON Interfaces			
GPON IAW G.984.1	O	Met	See Note 2.
GPON IAW G.984.2	O	Met	See Note 2.
GPON IAW G.984.3	O	Met	See Note 2.
GPON IAW G.984.4	O	Met	See Note 2.
GPON IAW G.984.5	O	Met	See Note 2.
GPON IAW G.984.6	O	Met	See Note 2.
GPON IAW G.984.7	O	Met	See Note 2.
EPON IAW 802.3ah	O	Not Supported	See Note 2.
GEAPON IAW 802.3av	O	Not Supported	See Note 2.
BPON IAW G.983	O	Not Supported	See Note 2.
Network Management Interfaces			
10Base-T	O	Met	See Note 3.
100Base-T	O	Met	See Note 3.
UNI Interfaces			
10Base-X	O	Met	See Note 4.
100Base-X	O	Met	See Note 4.
1000Base-X	O	Met	See Note 4.
NOTES: 1. This interface was previously tested in the lab and is met through a letter of compliance. 2. The SUT must support at least one of the OLT to ONT PON interfaces listed. 3. The UCR doesn't specify the type of network management interface for the PON. 4. The SUT must support at least one of the UNI Interfaces listed.			
LEGEND: BPON Broadband Passive Optical Network OLT Optical Line Terminal C Conditional ONT Optical Network Terminal EPON Ethernet Passive Optical Network PON Passive Optical Network Gbps Gigabits per second R Required GPON Gigabit Passive Optical Network SUT System Under Test IAW In Accordance With UCR Unified Capabilities Requirements NNI Network-to-Network Interface UNI User-Network Interface O Optional			

Table 3. SUT Capability Requirements and Functional Requirements Status

CR/FR ID	UCR Requirement (High-Level) (See Note 1)	Status
1	Interfaces (R)	Met See Note 2.
2	Class of Service Markings (R)	Partially Met See Notes 3.
3	Virtual Local Area Network Capabilities (R)	Met
4	Protocols (O)	Met
5	Quality of Service Features (R)	Partially Met See Notes 3.
6	Voice Services (R)	Met
7	Video Services (R)	Met
8	Data Services (R)	Met

Table 3. SUT Capability Requirements and Functional Requirements Status (continued)

CR/FR ID	UCR Requirement (High-Level) (See Note 1)	Status
9	Information Assurance (R)	Met (See Reference (d) and Note 6.)
10	PON Network Management (R)	Partially Met See Note 4.
11	Configuration Control (R)	Met
12	Operational Changes (R)	Met
13	Performance Monitoring (R)	Met
14	Alarms (R)	Met
15	Reporting (R)	Met
16	Fiber Media (R)	Met
17	Radio Frequency-over-Glass (O)	Met
18	Traffic Engineering (R)	Partially Met See Notes 3.
19	Virtual Local Area Network Design and Configuration (R)	Met
20	Power Backup (R)	Met
21	Availability (O)	Met
22	Redundancy (R)	Met
23	Survivability (R)	Met
24	Summary of Passive Optical Network Requirements by Subscriber Mission (R)	Met
25	ASLAN Access Non-Blocking Ratio 8:1 (R)	Partially Met See Notes 5.

NOTES:

1. The annotation of ‘required’ refers to a high-level requirement category. The applicability of each sub-requirement is provided in Table 3-5.

2. All ONTs failed auto negotiation at 1 gigabit per second at half duplex and DISA adjudicated this discrepancy as minor without POAM and COF.

3. The test instrument needed to be configured to a value different from the baseline indicated in the PON test plan. The baseline in the test plan is 99.6% of maximum load with a 50% oversubscription. The SUT could not shape the queues at this level. The baseline was throttled down to 75% max load with a 50% oversubscription.

4. The SUT management Console does not monitor jitter, and DISA adjudicated this discrepancy as minor without POAM and COF.

5. The two SUT components ONTs 728GP and 729GP have total 24 ports of Ethernet 10/100/1000 Mbps on client side and one PON port with approximately 1000Mbps speed on network side. JITC tested 8 to 1 blocking ASLAN requirement by forcing the client side ports to 100Mbps. JITC recommends that all the ASLAN-HA deployments should configure these client side ports to 100Mbps.

6. Information Assurance was test by the JITC IA team and the results are reported in a separate IA report.

LEGEND:

ASLAN	Assured Services Local Area Network	JITC	Joint Interoperability Test Command
COF	Condition Of Fielding	Mbps	Megabits per second
CR	Capability Requirement	O	Optional
DISA	Defense Information System Agency	ONT	Optical Network Terminal
DSCP	Differentiated Services Code Point	POAM	Plan Of Action & Mitigation
FR	Functional Requirement	PON	Passive Optical Network
HA	High Availability	R	Required
IA	Information Assurance	SUT	System Under Test
ID	Identification	UCR	Unified Capabilities Requirements

Table 4. SUT Product Summary

Product Identification			
Product Name	Tellabs Gigabit Passive Optical Network		
Software Release	29.0		
UC Product Type(s)	GPON		
Product Description	Passive optical Network		
Product Components (See note.)	Component Name	Version	Remarks
OLT	1150	29.0	
OLT	1150E	29.0	
OLT	1134AC	29.0	

Table 4. SUT Product Summary (continued)

Product Components (See note.)		Component Name	Version	Remarks
OLT		1134 DC	29.0	
OLT		1131	29.0	
ONT		728GP	29.0	
ONT		729GP	29.0	
ONT		120C	29.0	
ONT		120W	29.0	
ONT		140C	29.0	
ONT		140W	29.0	
Voice Gateway		Tellabs Voice Gateway	29.0	Used to verify voice functions.

NOTE: The detailed component and subcomponent list is provided in Enclosure 3.

LEGEND:

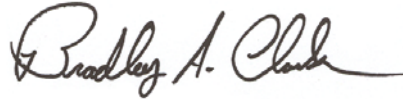
GPON	Gigabit Passive Optical Network	SUT	System Under Test
OLT	Optical Line Terminal	UC	Unified Capabilities
ONT	Optical Network Terminal		

4. Test Details. This certification is based on interoperability testing and review of the vendor's Letters of Compliance (LoC). Testing was conducted at JITC's Advanced Technologies Test lab at Indian Head, Maryland facility from 26 August to 9 October 2015, using test procedures derived from References (b) and (c). Information Assurance (IA) testing was conducted by JITC IA test team and the results are published in a separate report, Reference (d). Enclosure 2 documents the test results and describes the tested network and system configurations. Enclosure 3 provides a detailed list of the interface, capability, and functional requirements.

5. Additional Information. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Sensitive but Unclassified Internet Protocol (IP) Data (formerly known as NIPRNet) e-mail. Interoperability status information is available via the JITC System Tracking Program (STP). STP is accessible by .mil/.gov users at <https://stp.fhu.disa.mil/>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <https://jit.fhu.disa.mil/>. Due to the sensitivity of the information, the IA Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly from the Unified Capabilities Certification Office (UCCO), e-mail: disa.meade.ns.list.unified-capabilities-certification-office@mail.mil. All associated information is available on the DISA UCCO website located at <http://www.disa.mil/Services/Network-Services/UCCO>.

6. **Point of Contact (POC).** The JITC point of contact is Mr. Son Pham, commercial telephone 301-743-4258; e-mail address son.m.pham2.civ@mail.mil; mailing address Joint Interoperability Test Command, ATTN: JTE2 (Mr. Son Pham) 3341 Strauss Avenue, Suite 236, Indian Head, Maryland 20640-5149. The UCCO tracking number for the SUT is 1505701.

FOR THE COMMANDER:



for RIC HARRISON

Chief

Networks/Communications and UC Division

3 Enclosures a/s

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DISA/TEMC

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DOT&E, Netcentric Systems and Naval Warfare

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UCCO

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ADDITIONAL REFERENCES

- (c) Joint Interoperability Test Command, "UCR 2013, Errata-1, Passive Optical Network (PON) Test Procedures," October 2015
- (d) Joint Interoperability Test Command, "Information Assurance Assessment Report for Tellabs Gigabit Passive Optical Network (GPON) Software Release (SR) 29.0," January 2016

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TEST CERTIFICATION SUMMARY

1. SYSTEM AND REQUIREMENTS IDENTIFICATION. The Tellabs Gigabit Passive Optical Network (GPON) Software Release 29.0 is hereinafter referred to as the System Under Test (SUT). Table 2-1 depicts the SUT identifying information and requirements source.

Table 2-1. System and Requirements Identification

System Identification			
Sponsor	United States Army and Defense Information Systems Agency (DISA)		
Sponsor Point of Contact	Army: Mr. Jordan Silk, USAISEC TIC, Building 53302, Fort Huachuca, Arizona 85613; e-mail: jordan.silk@us.army.mil		
Vendor Point of Contact	Vendor Point of Contact: Mr. Russ Kulpins. russell.kulpins@tellabs.com 630-798-5559 Alternate Vendor Point of Contact: Mr. Tom Dobozy. Tom.Dobozy@tellabs.com 972-588-7810		
System Name	Tellabs Gigabit Passive Optical Network		
Increment and/or Version	Software Release 29.0		
Product Category	PON		
System Background			
Previous certifications	Software Release 27		
Tracking			
UCCO ID	1505701		
System Tracking Program ID	5136		
Requirements Source			
Unified Capabilities Requirements	Unified Capabilities Requirements 2013 Errata-1, PON, Section 7.5		
Remarks	N/A		
Test Organization(s)			
Joint Interoperability Test Command and DISA			
LEGEND:			
DISA	Defense Information Systems Agency	TIC	Technology Integration Center
PON	Passive Optical Network	UCCO	Unified Capabilities Certification Office
ID	Identification	USAISEC	United States Army Information Systems Engineering Command
N/A	Not Applicable		

2. SYSTEM DESCRIPTION. Passive Optical Network (PON) is a technology composed of an Optical Line Terminal (OLT), a varying number of Optical Network Units/Terminals (ONUs/ONTs) with fiber optic cable and splitters connecting them. Interface from the backbone network [Network-to-Network Interface (NNI) or Ingress] is provided by the OLT while the user interface [User Network Interface (UNI) or Egress] is provided by the ONT. A PON is a converged transport schema designed to carry multiple services such as VoIP, Data, IP Video, and Radio Frequency (RF) Video.

a. General Description. The Tellabs Optical Local Area Network (LAN) solution consists of an OLT and ONTs. The Tellabs OLT (1131, 1134, 1150 and 1150E), combined with an ONT (120C, 120W, 140C, 140W, 728GP, or 729GP), and the 1000 Voice Gateway comprise the SUT. The system is managed by the Tellabs PON Manager.

Tellabs Optical LAN is a PON architecture composed of an OLT, a varying number of ONUs/ONTs, and fiber optic cable and splitters connecting them. Interface from the backbone network [NNI or Ingress] is provided by the OLT while the user interface [UNI or Egress] is

provided by the ONT. The Tellabs Optical LAN is a GPON system serving both the access layer and distribution within the definitions of the Unified Capabilities Requirements (UCR). The OLT and ONTs taken together represent the distribution and access layers of an optical LAN. The platform can also provide traditional analog voice services via the Tellabs 1000 Voice Gateway. Voice services are supported using the ONT729GP.

The solution is typically deployed in the optical LAN application where the system provides 1 Gigabit/s Ethernet (GbE) services to the desktop. The ONT can be a “fiber to the desktop” application where an ONT is placed on each desktop, or it can be a “fiber to the communications closet” application where each ONT provides up to 24 Ethernet and 24 Voice circuits.

b. Components Under Test. Figure 2-3 depicts the test configuration, components, and connectivity schemes employed during the IA assessment. The system consists of the following components:

- Tellabs Panorama Element Management System (EMS) and client
- Tellabs 1150 OLT
- Tellabs 1150E OLT
- Tellabs 1134AC and 1134DC OLT
- Tellabs 1131 OLT
- Tellabs Voice Gateway
- ONTs (728GP, 729GP, 120C, 120W, 140C, 140W)

Component 1. Tellabs Panorama EMS – Government furnished equipment.

- Panorama PON EMS is a Windows-based EMS that provides a robust Graphical User Interface (GUI).
- Panorama PON provides centralized configuration, provisioning, fault, performance, administration, and security for networks containing the Tellabs® Access network products.
- Panorama PON release 29.0 manages Tellabs® 1131, Tellabs® 1134, Tellabs® 1150, and Tellabs® 1150E OLTs, Tellabs® ONTs, and Tellabs® 1000 VGW

Component 2. Tellabs 1150 OLT

- Tellabs® 1150 23-inch Chassis (formerly known as the Tellabs 1150 MDS5) 23-inch Fan Tray assembly (2)
- Ethernet Switch Unites (ESU) 2 – Supports redundant 240G ESU with four 1 GbE and two 10GbE uplink/transport interfaces each
- Time Distribution Unit (TDU) 1 – Supports redundant TDU
- Quad Optical Interface Units (QOIU) 7 – Supports up to 16 QOIU, supporting four GPON ports each. Each port can support up to 32 ONTs through a 1:32 optical splitter

Component 3. Tellabs 1150E OLT

- Tellabs® 1150E 19-inch Chassis (formerly known as the Tellabs 1150 MDS7) 19-inch Fan Tray assembly (2)

- ESU2 – Redundant 240G ESU with four 1GbE and two 10GbE uplink/transport interfaces each
- QOIU7 – Supports up to 14 QOIU, supporting four GPON ports each. Each port can support up to 32 ONTs through a 1:32 optical splitter

Component 4. Tellabs 1134AC and 1134DC OLT

- Tellabs® 1134AC 19-inch Chassis, 120/240 AC Powered
- Tellabs® 1134DC 19-inch Chassis, -48V DC Powered
- Optical Fan Assembly 1
- ESU30 – Supports redundant 24G ESU with six 1GbE uplink/transport interfaces each
- QOIU7 – Supports up to 4 QOIU, supporting four GPON ports each. Each port can support up to 32 ONTs through a 1:32 optical splitter

Component 5. Tellabs 1131 OLT

- Tellabs® 1131 1 Rack Unit (RU) (1.75”) 19-inch Chassis, 120/240 AC Powered
- Integrated ESU with four 1GbE and two 10GbE uplink/transport interfaces
- Four integrated GPON ports. Each port can support up to 32 ONTs through a 1:32 optical splitter

Component 6. Tellabs Voice Gateway –

- Twenty-two (22) slots (1 through 22, from left to right). The following cards may be displayed in these slots:
- Internet Protocol (IP) Management Interface (IPMI) - This card hosts the system's Transaction Language 1 (TL1) interfaces and provides the IP management interface to EMS.
- External Timing Interface (ETI) - This card receives the BITS composite clock and performs timing for all time division multiplexing (TDM) functions within the Network Element (NE).
- Expansion Line Unit (ELU) - This card connects the common shelf to the gateway (expansion) shelves within the NE.
- GbE - This card provides the interface to the Voice over IP (VoIP) network. It aggregates and distributes packets to and from the gateway shelves within the NE.
- Datalink Processor (DLP) - This card processes the Generic Requirement (GR) 303 (GR303) Timeslot Management Channel (TMC) and Embedded Operations Channel (EOC) datalinks. This card is not used in GR8 or Integrated Network Access (INA) applications.
- Operations Systems Interface (OSI) - This card provides a datalink to external testing and monitoring equipment.

Component 7. Tellabs ONTs

- ONT120W – 2 GbE port with local or remote power, indoor, in wall
- ONT120C – 2 GbE port with local or remote power, indoor
- ONT140C – 4 GbE port with local or remote power, indoor
- ONT728GP – 24 GbE ports w/PoE, indoor

- ONT729GP – 24 Plain Old Telephone Service (POTS) ports and 24 GbE ports w/PoE, indoor
- ONT140W – 4 Gigabit Ethernet port with local or remote power, indoor

3. OPERATIONAL ARCHITECTURE. The Unified Capabilities (UC) architecture is a two-level network hierarchy consisting of Defense Information Systems Network (DISN) backbone switches and Service/Agency installation switches. The Department of Defense (DoD) Chief Information Officer and Joint Staff policy and subscriber mission requirements determine which type of switch can be used at a particular location. The UC architecture, therefore, consists of several categories of switches. Figure 2-1 depicts the Notional Operational UC Architecture in which the SUT may be used.

4. TEST CONFIGURATION. The Joint Interoperability Test Command (JITC) test team conducted testing of the SUT at its Indian Head, Maryland facility in a manner and configuration similar to that of a notional operational environment as depicted in Figure 2-1. Testing of the system's required functions and features was conducted using the test configurations depicted in Figures 2-2 and 2-3. Interoperability testing was conducted after the completion of Information Assurance (IA) testing using the same configuration.

5. METHODOLOGY. Testing was conducted using PON product requirements derived from the Unified Capabilities Requirements (UCR) 2013, Reference (b), and the UCR 2013 PON Component IO Test Plan test procedures, Reference (c). Any discrepancies noted were written up in Test Discrepancy Reports (TDRs). The vendor submitted Plan of Action and Milestones (POA&M) as required. The TDRs were adjudicated by the Defense Information Systems Agency (DISA) as minor. Any new discrepancy noted in the operational environment will be evaluated for impact on the existing certification. These discrepancies will be adjudicated to the satisfaction of DISA via a vendor POA&M, which will address all new critical TDRs within 120 days of identification.

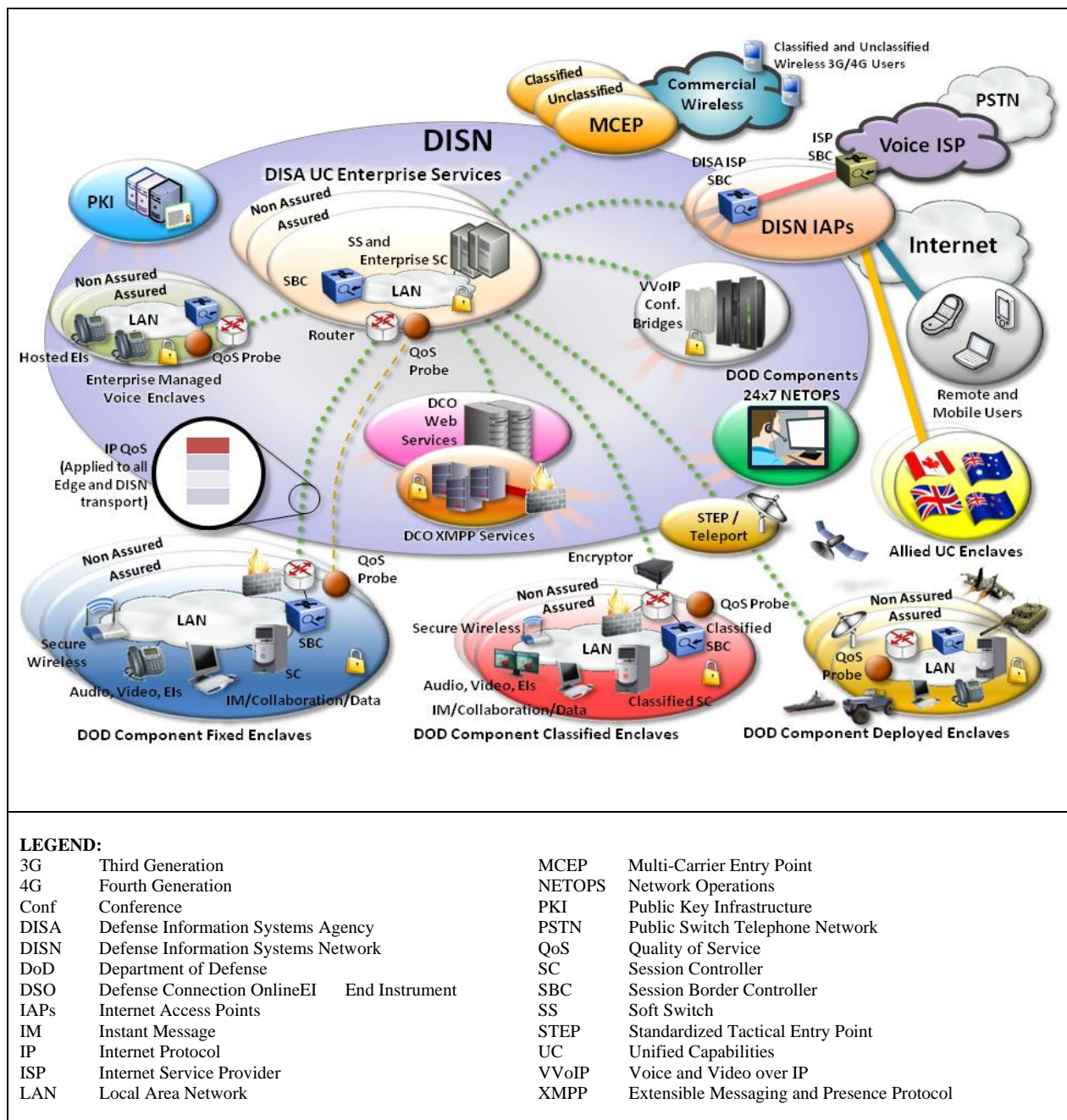


Figure 2-1. Notional UC Network Architecture

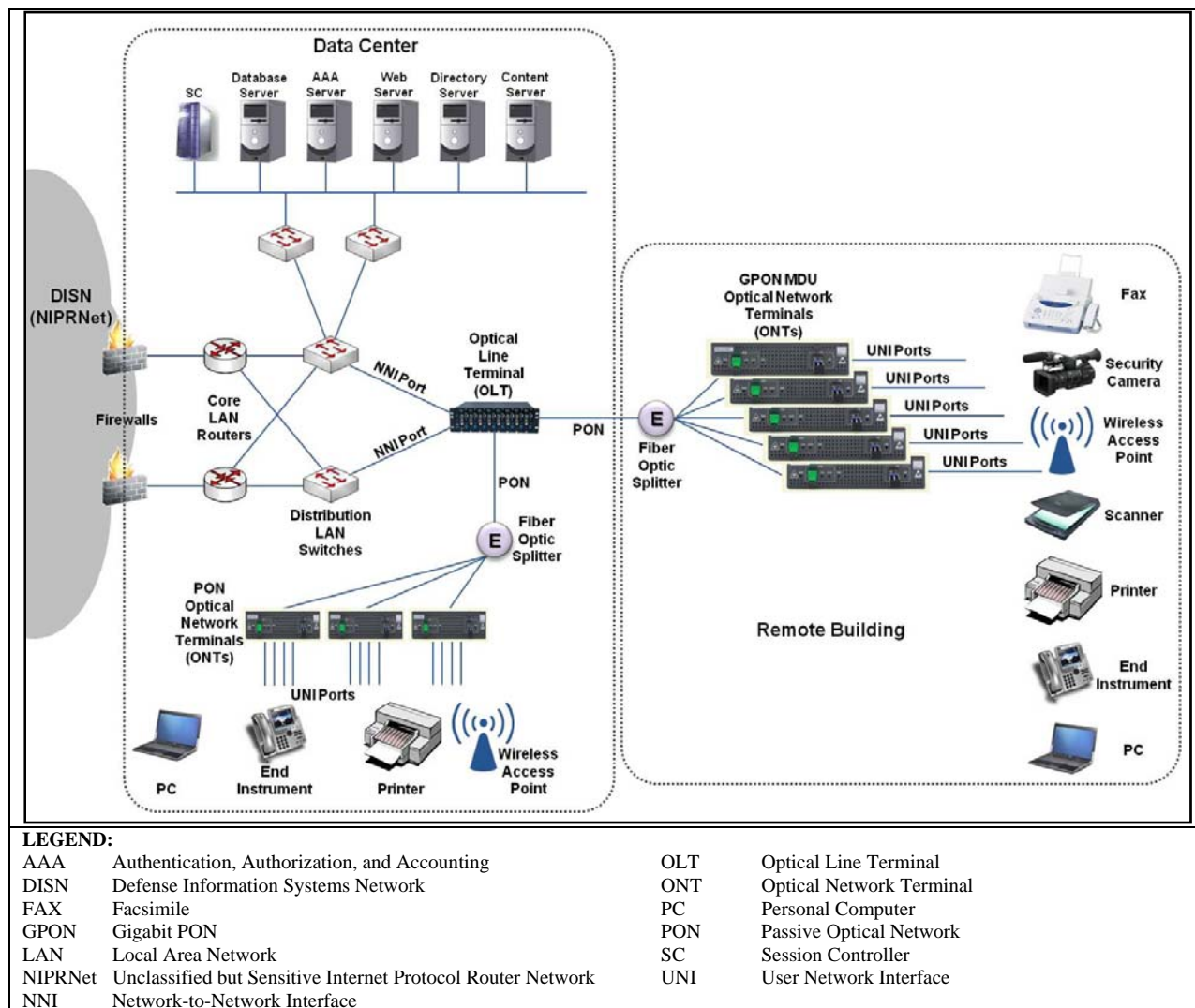


Figure 2-2. PON Functional Reference Model

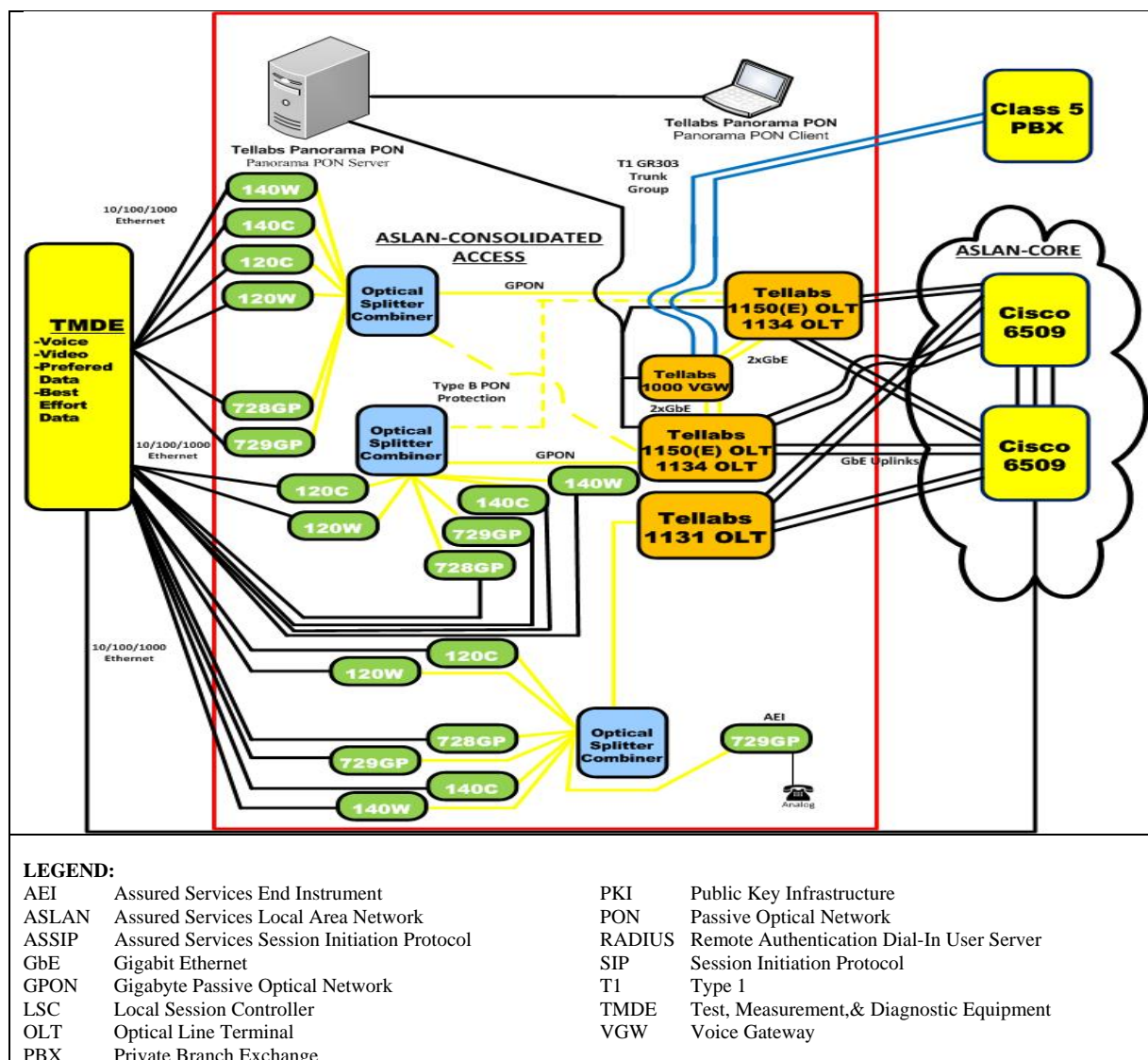


Figure 2-3. SUT's DISN Interoperability Test Configuration

6. INTEROPERABILITY REQUIREMENTS, RESULTS, AND ANALYSIS. The interface, Capability Requirements (CR) and Functional Requirements (FR), Information Assurance (IA), and other requirements for PONs are established by UCR 2013, section 7.5.

a. INTERFACE STATUS. The SUT Interface status and detailed requirements are provided in Table 3-1. The common PON operational framework technologies in use are Ethernet PON (EPON), Broadband PON (BPON) and GPON. The UCR 2013, section 7.5.2, defines four types of interfaces in a typical PON: NNI, OLT to ONT, Network Management, and UNI. The SUT interface status is provided in Table 3-1.

(1) Network Management. The UCR 2013, section 7.5.2.3 states that the PON products shall support the following network monitoring features:

(a) Simple Network Management Protocol (SNMP) in accordance with (IAW) RFCs 1157, 3410, 3411, 3412, 3413, and 3414. The SUT met the requirements through the vendor's Letter of Compliance (LoC) and IA/IO testing.

(b) SNMP Traps IAW RFC 1215. See (a) above.

(c) Remote Monitoring (RMON) IAW RFC 2819. The SUT met this requirement through the vendor's LoC.

(d) Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework IAW RFC 3584. The SUT met this requirement through the vendor's LoC.

(e) The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826. Security was tested by JITC Indian Head-led IA test teams, and the results were published in a separate report, Reference (d).

(2) Network to Network Interface (NNI) (Ingress). The NNI interface is composed of the uplink between the OLT and the Core network (LAN or Wide Area Network (WAN)). The UCR 2013, section 7.5.2.1 states that the PON must support either 100 Mbps IAW Institute of Electrical and Electronics (IEEE) 802.3u or 1000 Mbps IAW IEEE 802.3z. Other rates and IEEE standards may be provided as optional interfaces. The SUT NNI ports shall provide the parameters on a per-port basis as specified in Table 3-4. The SUT may provide a Fibre channel interface IAW ANSI INCITS T11.2 and T11.3 (previously known as X3T9.3). The SUT supports NNI interfaces of 1000 and 10000 Mbps IAW IEEE 802.3z and 802.3ae.

(3) Optical Line Terminal to Optical Network Terminal (PON interface). The UCR 2013, section 7.5.2.2 states that the PON system shall provide one of the following PON technologies:.

- (a) GPON IAW ITU-T G.984 series (G.984.1 through G.984.7)
- (b) EPON IAW IEEE 802.3ah
- (c) Gigabit Ethernet PON (GEAPON) IAW IEEE 802.3av
- (d) BPON IAW ITU-T G.983

If the PON supports GPON, then the OLT to ONT interface is defined by the ONT Management Control Interface (OMCI) protocol and was standardized and defined by the ITU standard G.984.4. The number of ONTs is driven by the required bandwidth for each user and in accordance with the traffic engineering guidelines in Section 7.5.19, Traffic Engineering. The OLT to ONT interface will support the Telcordia Standards shown in Table 7.5-1, OLT to ONT Signaling Standards. The SUT supports (a) above.

(4) User Network Interface. The UCR 2013, section 7.5.2.4 states that the PON products shall support at least one of the user interface rates listed below. In addition, the PON must support traffic conditioning.

(a) 10 Mbps IAW IEEE 802.3i. This interface linked up at the required rates and negotiated for the correct rates, which met this requirement.

(b) 100 Mbps IAW IEEE 802.3u. This interface linked up at the required rates and negotiated for the correct rates, which met this requirement.

(c) 1000 Mbps IAW IEEE 802.3ab. This interface linked up at the required rates and negotiated for the correct rates, which met this requirement.

b. CAPABILITY AND FUNCTION REQUIREMENTS AND STATUS. The SUT CR/FR status and detailed requirements are provided in Table 3-2. A summary of the SUT's ability to meet UCR requirements are provided in the sub-paragraphs below.

(1) Interfaces. The UCR 2013, Section 7.5.2, states that uplink (NNI interface) between the OLT and the Core network (LAN or WAN) shall minimally be an IEEE 802.3 interface. The NNI shall be one of the following rates: 100 Mbps IAW IEEE 802.3u or 1000 Mbps IAW IEEE 802.3z. The OLT to ONT/ONU PON interfaces shall provide one of the following PON (OLT to ONT/ONU) technologies: GPON IAW G.984 series, EPON IAW 802.3ah. (1 Gbps), GE-PON IAW 802.3av (10 Gbps), BPON IAW G.983. The network Management Interface shall support the following network monitoring features: SNMP IAW RFCs 1157, 3410, 3411, 3412, 3413, and 3414, SNMP Traps IAW RFC 1215, RMON IAW RFC 2819, Internet-Standard Network Management Framework IAW RFC 3584, and Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826. The UNI interfaces shall provide at least one of the following user interface rates: 10 Mbps IAW IEEE 802.3i, 100 Mbps IAW IEEE 802.3u, 1000 Mbps IAW IEEE 802.3z, 1000 Mbps IAW IEEE 802.3ab. The SUT is certified as interoperable for joint use with interfaces as noted in Table 3-1.

(2) Class of Service Markings. The UCR 2013, section 7.5.3 states that the PON network shall comply with Access product requirements in section 7.2.1.3, Class of Service Markings, paragraph 1 (d). The UCR 2013, section 7.2.1.3 states that the Access products (including PON) shall be capable of supporting the prioritization of aggregate service classes with queuing according to Section 7.2.1.6, Quality of Service Features. Queuing may be supported in either of the two following class of service (CoS) methods:

(a) Layer 3 CoS. The SUT partially met this requirement IAW the UCR, please see note 3 on Table-3.

(b) Layer 2 CoS. The SUT partially met this requirement IAW the UCR, please see note 3 on Table-3.

(3) Virtual LAN Capabilities. The SUT met the VLAN requirements IAW UCR 2013, section 7.5.4 states that the NNI and UNI PON ports shall comply with section 7.2.1.4, Virtual LAN Capabilities.

(a) The UCR 2013, section 7.2.1.4 states that the products shall be capable of accepting VLAN tagged frames and supporting VLAN types IAW IEEE 802.1Q. The VLAN IDs on an ingress port shall be configurable to any of the 4094 values except 0 and 4095.

(b) The UC products must be capable of accepting VLAN tagged frames and assigning them to the VLAN identified in the IEEE 802.1Q VID field. The VLAN IDs on an ingress port shall be accepted to any of the 4094 values except 0 and 4095.

(4) Protocols. The SUT met the Protocols requirement IAW the UCR 2013, section 7.5.5 states that the PON network shall support bridging at Layer 2 of the OSI model.

(a) RFC 2819 Remote Network Monitoring Management Information Base - The SUT met this requirement IAW the UCR.

(b) Port-Base Access Control IAW 802.1x – The SUT met this requirement IAW the UCR.

(c) RFC 2460/5095 Maximum Transmission Unit – The SUT met this requirement IAW the UCR.

(d) RFC 4293 Management Information Base for the IP – The SUT met this requirement IAW the UCR.

(5) Quality of Service (QoS) Features. The UCR 2013, section 7.5.6 states that the PON shall comply with the Access product requirements listed in section 7.2.1.6, Quality of Service Features. PON products targeted for non-assured services are not subject to the Layer 3 queuing requirements in this section and the conditions of fielding will state whether the PON can support Assured Services or not. The SUT partially met this requirement IAW the UCR, please see note 3 on Table-3.

(a) Section 7.2.1.6 states that Access products shall be capable of providing the following QoS features:

1. Provide a minimum of four queues.
2. Assign any incoming access/user-side tagged session to any of the queues for prioritization onto the egress trunk.

3. Support Differentiated Services (DS), Per-Hop Behaviors (PHBs), and traffic conditioning.

4. All queues shall be capable of having a bandwidth assigned of percentage of traffic. The bandwidth or traffic percentage shall be fully configurable per queue from 0 to 100 percent.

5. The products shall calculate the bandwidth associated with traffic conditioning within a margin of error of 10 percent. When the other queues are not saturated, the Best Effort traffic may surge beyond its traffic-engineered limit.

(b) The Access product may provide a minimum of six queues.

(c) The Access product shall support the Differentiated Services Code Point (DSCP) plan as shown in UCR 2013, table 7.2-3. The DS assignments shall be software configurable for

the full range of six bit values. The SUT partially met the QoS requirements IAW UCR 2013, section 7.5.6.

(6) Voice Services. The UCR 2013, section 7.5.7 states that the PON shall meet the latency, jitter, and packet loss requirements listed below. These requirements shall be achievable over any five-minute measured period under congested conditions. Congested conditions are defined as 100 percent of link capacities (as defined by baseline traffic engineering 25 percent voice/signaling, 25 percent IP video, 25 percent preferred data, and 25 percent best effort traffic).

(a) The PON shall have the capability to transport prioritized voice IP packets, media, and signaling, with no more than 6 ms latency end-to-end (E2E) across the PON SUT. The SUT met this requirement.

(b) The PON shall have the capability to transport prioritized voice IP packets across the PON SUT with no more than 3 ms of jitter. The measured jitter for the SUT was 0.000 ms, which met the requirement.

(c) The PON shall have the capability to transport prioritized IP packets across the PON SUT with packet loss not to exceed configured traffic engineered (queuing) parameters. Actual measured packet loss across the PON shall not exceed 0.045 percent within the defined queuing parameters. The measured packet loss for the SUT was 0.00 percent, which met the requirement.

(7) Video Services. The UCR 2013, section 7.5.8 states that the PON shall meet the latency, jitter, and packet loss requirements listed below. These requirements shall be achievable over any five-minute measured period under congested conditions. The SUT met this requirement with testing and the vendor's LoC.

(a) The PON shall have the capability to transport prioritized video IP packets with no more than 30 ms latency across the PON SUT. Latency is increased over prioritized voice IP packets because of the increased size of the packets (218 bytes for voice packets and up to 1518 bytes for video). The measured latency for the SUT met the requirement.

(b) The LAN shall have the capability to transport prioritized video IP packets across the PON SUT with no more than 30 ms of jitter. The measured jitter for the SUT was 0.000 ms, which met the requirement.

(c) The PON shall have the capability to transport prioritized video IP packets across the PON SUT with packet loss not to exceed configured traffic engineered (queuing) parameters. Actual measured packet loss across the PON shall not exceed 0.15 percent within the defined queuing parameters. The measured packet loss for the SUT was 0.00 percent, which met the requirement.

(8) Data Services. The UCR 2013, section 7.5.9 states that the PON shall meet the latency and packet loss requirements listed below. There are no jitter requirements for preferred data IP packets. These requirements shall be achievable over any five-minute measured period under congested conditions.

(a) The PON shall have the capability to transport prioritized data IP packets with no more than 45 ms latency across the PON SUT. Latency is increased over voice IP packets because of the increased size of the packets (218 bytes for voice packets and up to 1518 bytes for data). The measured latency for the SUT met the requirement.

(b) The PON shall have the capability to transport prioritized data IP packets across the PON SUT with packet loss not to exceed configured traffic engineered (queuing) parameters. Actual measured packet loss across the LAN shall not exceed 0.15 percent within the defined queuing parameters. The measured packet loss for the SUT was 0.00 percent for Preferred Data and for Best Effort Data, which met the requirement.

(9) Information Assurance. The UCR 2013, section 7.5.10 states that the PON must comply with the applicable Security Technical Implementation Guides (STIGs). The IA requirements were tested by JITC Indian Head-led IA test teams and the results were published in a separate report, Reference (d).

(10) PON Network Management. The UCR 2013, section 7.5.11 states that the network managers must be able to monitor, configure, and control all aspects of the network and observe changes in network status. The PON infrastructure components shall have a Network Management (NM) capability that leverages existing and evolving technologies and has the ability to perform remote network product configuration /reconfiguration of objects that have existing DoD Global Information Grid (GIG) management capabilities. The PON infrastructure components must be able to be centrally managed by an overall Network Management System (NMS). In addition, Management Information Base (MIB) II shall be supported for SNMP. In addition, if other methods are used for interfacing between PON products and the NMS, they shall be implemented in a secure manner, such as with the methods in UCR 2013, sections 7.5.11.1 through 7.5.11.5. The SUT partially met the requirements through the vendor's LoC and testing. The SUT is unable to measure jitter from its management console. A TDR was written for this requirement, and DISA adjudicated this discrepancy as minor without POAM and COF.

(11) Configuration Control. The UCR 2013, section 7.5.12 states that local area networks shall have a Network Management (NM) capability that leverages existing and evolving technologies and has the ability to perform remote network product configuration/reconfiguration of objects that have existing DoD GIG management capabilities. The NMS shall report configuration change events in near-real time (NRT), whether or not the change was authorized. The system shall report the success or failure of authorized configuration change attempts in NRT. NRT is defined as within five seconds of detecting the event, excluding transport time. The SUT met the requirements through the vendor's LoC and testing.

(12) Operational Changes. The UCR 2013, section 7.5.13 states that the PON shall report the status of networks and associated assets in NRT 99 percent of the time (with 99.9 percent as an Objective Requirement). NRT is defined as receiving operational changes within five seconds of querying the status (polled) or within five seconds of receiving status

changed (pushed), excluding transport time. The SUT met the requirements through the vendor's LoC and testing.

(13) Performance Monitoring. The UCR 2013, section 7.5.14 states that all PON infrastructure components shall be capable of providing status changes 99 percent of the time (with 99.9 percent as an Objective Requirement) by means of an automated capability in NRT. An NMS will have an automated NM capability to obtain the status of networks and associated assets 99 percent of the time (with 99.9 percent as an Objective Requirement) within five seconds of querying the status (polled) or within five seconds of receiving status changes (pushed) from the monitored device. The NMS shall collect statistics and monitor bandwidth utilization, delay, jitter, and packet loss. The SUT met the requirements through the vendor's LoC and testing.

(14) Alarms. The UCR 2013, section 7.5.15 states that the PON shall report alarms as traps via SNMP in NRT. More than 99.95 percent of alarms shall be reported in NRT. NRT is defined as receiving alarm changes within five seconds of querying the status (polled) or within five seconds of receiving alarm changes (pushed) from the monitored device. In addition to the alarms defined in this section, the OLT shall support the alarms as defined by ITU G994.4. The SUT met the requirements through the vendor's LoC and testing.

(15) Reporting. The UCR 2013, section 7.5.16 states that the PON shall have the NM capability of automatically generating and providing an integrated/correlated presentation of network and all associated networks. In addition, the PON system must also report optical errors to include degraded optical conditions. The SUT met the requirements through the vendor's LoC and testing.

(16) Fiber Media. The UCR 2013, section 7.5.17 states that Fiber Optic Cable used for the PON shall be Single Mode Fiber. The single mode fiber shall be in compliance with ITU G.652/TIA OS1/International Electromechanical Commission (IEC) B1.1. The SUT met the requirements through the vendor's LoC and testing.

(17) Radio Frequency-over-Glass (RFoG) Video. The UCR 2013, section 7.5.18 states that if the PON system supports GPON, then it may optionally support RFoG via PON and its RF overlay framework. ITU-T G.984.5 defines this band as an Enhancement band for video distribution services. This ITU forum also specifies a wavelength of 1150 nm to 1560 nm. This video capacity is in addition to the 2.4 Gbps downstream and 1.2 upstream capacity of GPON. It is the responsibility of the ONT to either block or separate the RFoG from the downstream GPON signal of 1480 to 1500 nm. The SUT met the requirements through vendor's LOC.

(18) Traffic Engineering. The UCR 2013, section 7.5.19 states that bandwidth required per subscriber must be in compliance with the requirements in this section and additional DoD regulations as applicable. The SUT partially met the requirements through the vendor's LoC and testing. The SUT partially met this requirement IAW the UCR, please see note 3 on Table-3.

(19) VLAN Design and Configuration. The UCR 2013, section 7.5.20 states that VLAN Design and Configuration for all PON networks must be in compliance with Distribution and

Access Layer Network Elements as defined in this section. The SUT met the requirements through the vendor's LoC and testing.

(20) Power Backup. The UCR 2013, section 7.5.21 states that the PON network must be in compliance with the requirements in this section. This is required if the PON Network Element is being placed into an ASLAN and optional if being placed into a non-ASLAN. The SUT met the requirements through the vendor's LoC and testing.

(21) Availability. The UCR 2013, section 7.5.22 states that availability of a PON network will be determined the same as for active Ethernet networks as defined in this section. PON Network Elements that are utilized in ASLANs and non-ASLANs must meet the availability requirements for the appropriate LAN. If the PON system supports GPON, then it may optionally support Type B PON Protection as defined in ITU-T G.984.1 3/2008 to provide increased reliability for all services carried on the PON, including data. Vendor submitted availability documentation meets High Availability (HA) requirements. The SUT met the requirements through the vendor's LoC and testing.

(22) Redundancy. The UCR 2013, section 7.5.23 states that redundancy is required if the PON Network Element is being placed into an ASLAN and optional if being placed into a non-ASLAN. The PON product shall have no single point of failure that can cause an outage of more than 96 IP telephone subscribers. It should be noted that a PON may be used with a single point of failure for more than 96 subscribers if 96 or less are IP telephone subscribers (i.e., 50 data, 20 video, and 50 IP telephony = 120 subscribers). If redundancy is met through single product, the following requirements are applicable: dual power supplies, dual processors (control supervisors), redundancy protocol, and backplane/bridging redundancy. If redundancy is met through a secondary product, the failover to the secondary product must not result in any lost calls and the failover to the secondary product must be restored within five seconds. The SUT met the requirements through the vendor's LoC and testing. The SUT was tested as a single chassis redundancy product.

(23) Survivability. The UCR 2013, section 7.5.24 states that the PON shall support a Layer 2 Dynamic Rerouting protocol. Failover shall occur in no more than five seconds. The SUT met the requirements through the vendor's LoC and testing.

(24) Summary of PON requirements by subscriber mission. The SUT partially met the requirements through the vendor's LoC and testing. See Table 1 above for more details.

(a) The UCR 2013, section 7.5.25 states that the PON Network Elements shall meet the same requirements as specified in Table 7.1-1, Summary of LAN Requirements by Subscriber Mission, as applicable for the LAN the Network Element will be included within to include meeting the IPv6 requirements as defined in Section 5, IPv6. Tellabs Technologies submitted availability documentation to note their product meets HA requirements. However, their solution does not support a Layer 2 dynamic rerouting protocol. DISA adjudicated this discrepancy on April 23, 2013, with the CoF statement that the solution cannot have more than 96 voice subscribers on a High Availability PON link. The SUT does support diverse routes from the two distinct interfaces on the OLT to an ONT.

7. HARDWARE/SOFTWARE/FIRMWARE VERSION IDENTIFICATION: Table 3-3 provides the system configurations and hardware and software components tested with the SUT. The SUT was tested in an operationally realistic environment to determine its interoperability capability with associated network devices and network traffic.

8. TESTING LIMITATIONS. JITC test teams noted the following testing limitations including the impact they may have on interpretation of the results and conclusions. Any untested requirements are also included in the testing limitations. Testing was completed using Test, Measurement, & Diagnostic Equipment. Tests were conducted in a lab environment and we are not able to duplicate the numerous different scenarios that could be if we had live users.

9. CONCLUSION(S). The SUT meets the critical interoperability requirements for a PON in accordance with the UCR and is certified for joint use with other UC Products listed on the Approved Products List.

DATA TABLES

Table 3-1. Interface Status

Interface	Applicability (R), (O), (C)	Status	Notes																																
NNI Interfaces																																			
100Base-T	O	Met	None																																
100Base-FX	O	Met	See note 1.																																
1000Base-T	O	Met	None																																
1000BaseX	O	Met	None																																
OLT to ONT PON Interfaces																																			
GPON IAW G.984.1	O	Met	See Note 2.																																
GPON IAW G.984.2	O	Met	See Note 2.																																
GPON IAW G.984.3	O	Met	See Note 2.																																
GPON IAW G.984.4	O	Met	See Note 2.																																
GPON IAW G.984.5	O	Met	See Note 2.																																
GPON IAW G.984.6	O	Met	See Note 2.																																
GPON IAW G.984.7	O	Met	See Note 2.																																
EPON IAW 802.3ah	O	Not Supported	See Note 2.																																
GEAPON IAW 802.3av	O	Not Supported	See Note 2.																																
BPON IAW G.983	O	Not Supported	See Note 2.																																
Network Management Interfaces																																			
10Base-T	O	Met	See Note 3.																																
100Base-T	O	Met	See Note 3.																																
UNI Interfaces																																			
10Base-X	O	Met	See Note 4.																																
100Base-X	O	Met	See Note 4.																																
1000Base-X	O	Met	See Note 4.																																
NOTES: 1. This interface was previously tested in the lab and is met through a letter of compliance. 2. The SUT must support at least one of the OLT to ONT PON interfaces listed. 3. The UCR doesn't specify the type of network management interface for the PON. 4. The SUT must support at least one of the UNI Interfaces listed.																																			
LEGEND: <table> <tr> <td>BPON</td><td>Broadband Passive Optical Network</td><td>OLT</td><td>Optical Line Terminal</td></tr> <tr> <td>C</td><td>Conditional</td><td>ONT</td><td>Optical Network Terminal</td></tr> <tr> <td>EPON</td><td>Ethernet Passive Optical Network</td><td>PON</td><td>Passive Optical Network</td></tr> <tr> <td>Gbps</td><td>Gigabits per second</td><td>R</td><td>Required</td></tr> <tr> <td>GPON</td><td>Gigabit Passive Optical Network</td><td>SUT</td><td>System Under Test</td></tr> <tr> <td>IAW</td><td>In Accordance With</td><td>UCR</td><td>Unified Capabilities Requirement</td></tr> <tr> <td>NNI</td><td>Network-to-Network Interface</td><td>UNI</td><td>User-Network Interface</td></tr> <tr> <td>O</td><td>Optional</td><td></td><td></td></tr> </table>				BPON	Broadband Passive Optical Network	OLT	Optical Line Terminal	C	Conditional	ONT	Optical Network Terminal	EPON	Ethernet Passive Optical Network	PON	Passive Optical Network	Gbps	Gigabits per second	R	Required	GPON	Gigabit Passive Optical Network	SUT	System Under Test	IAW	In Accordance With	UCR	Unified Capabilities Requirement	NNI	Network-to-Network Interface	UNI	User-Network Interface	O	Optional		
BPON	Broadband Passive Optical Network	OLT	Optical Line Terminal																																
C	Conditional	ONT	Optical Network Terminal																																
EPON	Ethernet Passive Optical Network	PON	Passive Optical Network																																
Gbps	Gigabits per second	R	Required																																
GPON	Gigabit Passive Optical Network	SUT	System Under Test																																
IAW	In Accordance With	UCR	Unified Capabilities Requirement																																
NNI	Network-to-Network Interface	UNI	User-Network Interface																																
O	Optional																																		

Table 3-2. Capability and Functional Requirements and Status

CR/FR ID	Capability/Function	Applicability (See Note 1)	UCR 2013 Reference	Status
1	Interfaces (R)			
	Minimally support IEEE 802.3u or 802.3z	Required	7.5.2.1	Partially Met See Note 2.
	Fiber Channel	Optional	7.5.2.1	N/A
	PON technologies	Required	7.5.2.2	Met
	OLT to ONT Signaling Standards	Optional for PON Required for GPON	7.5.2.2	Met
	Network monitoring features	Required	7.5.2.3	Met
	User Network Interface Rates	Required	7.5.2.4	Partially Met See Notes 3.
	User Network Interface Port Parameters	Required	7.5.2.4.1	Met
	Link Aggregation IAW 802.1AX	Optional	7.5.2.4.1	Partially Met See Notes 2.
	User Network Interface Optional Port Parameters	Optional	7.5.2.4.1	Partially Met See Notes 2.
2	Class of Service Markings (R)			
	Access product requirements (section 7.2.1.3, paragraph 1d.)	Required	7.5.3	Partially Met See Notes 3.
	Differentiated Services Code Point	Required	7.2.1.3	Partially Met See Notes 3.
3	Virtual Local Area Network Capabilities (R)			
	VLAN capabilities for the NNI and UNI PON ports in section 7.2.1.4	Required	7.5.4	Met
	VLAN tagging	Required	7.2.1.4	Met
4	Protocols (O)			
	Support bridging at OSI model Layer 2	Optional	7.5.5	Met
5	Quality of Service Features (R)			
	Access product requirements in section 7.2.1.6	Required	7.5.6	Partially Met See Notes 3.
	Access product Quality of Service Features	Required	7.2.1.6	Partially Met See Notes 3.
	Six-queue design	Optional	7.2.1.6	N/A
	DSCP support	Required	7.2.1.6	Partially Met See Notes 3
6	Voice Services (R)			
	Latency	Required	7.5.7.1	Met
	Jitter	Required	7.5.7.2	Met
	Packet Loss	Required	7.5.7.3	Met
7	Video Services (R)			
	Latency	Required	7.5.8.1	Met
	Jitter	Required	7.5.8.2	Met
	Packet Loss	Required	7.5.8.3	Met
8	Data Services (R)			
	Latency	Required	7.5.9.1	Met
	Packet Loss	Required	7.5.9.3	Met
9	Information Assurance (R)			
	Security Technical Implementation Guides	Required	7.5.10	Met (See Reference (d) and Note 6.)
10	PON Network Management (R)			
	PON components network management	Required	7.5.11	Partially Met See Notes 4.
	Secure Shell version 2	Required	7.5.11.1	Met
	PON product shall, by default, not accept Telnet	Required	7.5.11.2	Met (See Reference (d))
	HyperText Transfer Protocol Secure	Optional	7.5.11.3	N/A

Table 3-2. Capability and Functional Requirements and Status (continued)

CR/FR ID	Capability/Function	Applicability (See Note 1)	UCR 2013 Reference	Status
10	PON Network Management (R) (continued)			
	RFC 3414 for Simple Network Management Protocol	Optional	7.5.11.4	Met
	Secure implementation of other interfacing methods	Optional	7.5.11.5	N/A
11	Configuration Control (R)			
	The NMS shall report configuration changes in NRT.	Required	7.5.12	Met
12	Operational Changes (R)			
	PON shall report status of networks and assets in NRT.	Required	7.5.13	Met
13	Performance Monitoring (R)			
	PON components shall provide status changes in NRT.	Required	7.5.14	Met
14	Alarms (R)			
	The PON shall report alarms as Traps via SNMP in NRT.	Required	7.5.15	Met
	The OLD shall support the alarms as defined by ITU-T G994.4.	Required	7.5.15	Met
15	Reporting (R)			
	NM capability to automatically generate and provide presentation of network(s).	Required	7.5.16	Met
16	Fiber Media (R)			
	Single Mode Fiber in compliance with ITU G.652/TIA OS1/IEC B1.1	Required	7.5.17	Met
17	Radio Frequency-over-Glass (O)			
	PON supporting GPON may support RFoG.	Optional	7.5.18	Met
18	Traffic Engineering (R)			
	Bandwidth in compliance with requirements.	Required	7.5.19	Partially Met See Notes 3.
19	Virtual Local Area Network Design and Configuration (R)			
	VLAN Design and Configuration in compliance with Distribution and Access Layer Network Elements.	Required	7.5.20	Met
20	Power Backup (R)			
	Power backup, site-specific requirements	Required for ASLAN Optional for NON-ASLAN		Met
21	Availability (O)			
	Availability shall be the same as for active Ethernet networks.		7.5.22	Met
	If the PON supports GPON, it may optionally support Type B PON Protection.	Optional	7.5.22	Met
22	Redundancy (R)			
	PON products shall have no single point of failure that can cause an outage of more than 96 IP telephone subscribers.	Required for ASLAN Optional for NON-ASLAN	7.5.23	Met
	Single product redundancy	Optional	7.5.23.1	Met
	Dual product redundancy	Optional	7.5.23.2	N/A
23	Survivability (R)			
	The PON shall support Layer 2 dynamic rerouting protocol and failover shall occur in no more than 1 second.	Required	7.5.24	Met
24	Summary of Passive Optical Network Requirements by Subscriber Mission (R)			
	The PON Network Elements shall meet the same requirements as specified in Table 7.1-1, Summary of LAN Requirements by Subscriber Mission.	Required	7.5.25	Met

Table 3-2. Capability and Functional Requirements and Status (continued)

CR/FR ID	Capability/Function	Applicability (See Note 1)	UCR 2013 Reference	Status
24 (cont)	Summary of LAN Requirements by End User Mission Category. The PON shall meet all IPv6 requirements defined for a LAN access switch in Table 5.2-6.	Required	Table 7.1-1 7.5.25	Met
25	Access products (including PON that is used as an access device) shall not have a blocking factor that exceeds 8 to 1 (minimum). This blocking factor includes all hardware and software components.	Required	7.2.1 EDG-000010	Partially Met See Notes 5.

NOTES:

1. The annotation of ‘required’ refers to a high-level requirement category. The applicability of each sub-requirement is provided in Table 3-5.

2. All ONTs failed auto negotiation at 1 gigabit per second at half duplex and DISA adjudicated this discrepancy as minor without POAM and COF.

3. The test instrument needed to be configured to a value different from the baseline indicated in the PON test plan. The baseline in the test plan is 99.6% of maximum load with a 50% oversubscription. The SUT could not shape the queues at this level. The baseline was throttled down to 75% max load with a 50% oversubscription.

4. The SUT management Console does not monitor jitter, and DISA adjudicated this discrepancy as minor without POAM and COF.

5. The two SUT components ONTs 728GP and 729GP have total 24 ports of Ethernet 10/100/1000 Mbps on client side and one PON port with approximately 1000Mbps speed on network side, so JITC tested 8 to 1 blocking ASLAN requirement by forcing the client side ports to 100Mbps, so JITC recommends that all the ASLAN-HA deployments should configure these client side ports to 100Mbps.

6. Information Assurance was test by the JITC IA team and the results are reported in a separate IA report.

LEGEND:

ASLANAssured Services Local Area Network

COFCondition Of Fielding

CoSClass of Service

CPUCentral Processing Unit

CRCapabilities Requirement

DISADefense Information System Agency

DSCPDifferentiated Services Code Point

FRFunctional Requirement

GPONGigabit Passive Optical Network

HAHigh Availability

IAInformation Assurance

IAWIn Accordance With

IDIdentification

IECInternational Engineering Consortium

IEEEInstitute of Electrical and Electronics Engineers

IPInternet Protocol

ITU-TInternational Telecommunication Union-Telecommunication

JITCJoint Interoperability Testing Command

LACPLink Aggregation Control Protocol

LANLocal Area Network

MbpsMegabits per second

NANot Applicable

NMNetwork Management

NMSNetwork Management System

NRTNear Real Time

OOptional

OLTOptical Line Terminal

ONTOptical Network Terminal

OSIOpen Systems Interconnection

POAMPlan Of Action & Mitigation

PONPassive Optical Network

QoSQuality of Service

RRequired

RFCRequest For Comment

RFoGRadio Frequency over Glass

SNMPSimple Network Management Protocol

SUTSystem Under Test

TIATelecommunications Industry Association

UCRUnified Capabilities Requirement

VLANVirtual Local Area Network

Table 3-3. SUT Equipment Hardware and Software Components List

System Name	Equipment			
	Hardware	Card Name	Part Number /Name	Software/Firmware
Tellabs GPON	Tellabs Panorama / EMS (Component 1)	81.SR29PKG1150	GFE/Site Provided	Windows 7 SP 1 ActivClient 6.2.0.50
	Tellabs 1150 OLT (Component 2)	4125053	MDS5 Chassis, 16 I/O Slot	29.0
		4195091	MDS5 Fan Tray Assy (1U) + Fan power cable	
		4195091	MDS7 19" Chassis, 14 I/O Slot	
		4125073	19" Fan Tray Assy (1U)	
		81.11W-MDS7LUG2-R6	CBL KIT 19" Chassis - 14 I/O SLOT - 14FT 2HOLE LUG	
		4115091	ESU2- Ethernet Switching Unit- 2 X 10G & 4 X 1 Gbps; 2 for redundancy	
		4125005	AMU1 (alarm maintenance unit) – 16 dry contact inputs	
		4125001	TDU1 Timing Distribution Unit	
		4125004	QOIU7 QUAD GPON Card (4 SFPs included)	
		4195098	XFP, TDM, 10Gbps, 1310nm, industrial temp 5/3.3/1.8V - 10 Km	
	Tellabs 1150E OLT (Component 3)	4125061	MDS7 19" Chassis, 14 I/O Slot	
		4195091	MDS5 Fan Tray Assy (1U) + Fan power cable	
		4125073	19" Fan Tray Assy (1U) 81.11W-MDS7LUG2-R6 CBL KIT 19" Chassis - 14 I/O SLOT - 14FT	
		4115091	ESU2- Ethernet Switching Unit- 2 X 10G & 4 X 1 Gbps; 2 for redundancy	
		4125004	QOIU7 QUAD GPON Card (4 SFPs included)	
		4195098	XFP, TDM, 10Gbps, 1310nm, industrial	
		4115093	1134 Chassis	
	Tellabs 1134AC and 1134DC OLT (Component 4)	4115094	1134 Fan Tray Assembly	
		81.11C-ESU32-R5	ESU32 Ethernet Switching Unit	
		128211	Gbe SFP Wideband 850nm (1000 base SX)	
			550m	

Table 3-3. SUT Equipment Hardware and Software Components List (continued)

System Name	Equipment			
Tellabs GPON	Hardware	Card Name	Part Number /Name	Software/Firmware
	Tellabs 1131 OLT (Component 5)	81.11S-1131-10G-R5	1131 OLT (4x GPON SFP, 4x 1G + 2x 10G)	29.0
		81.11W-PC-C13-B-R6	PWR CORD 14AWF C13 to 3 PRONG 1.8M	
		128211	GbE SFP Wideband 850nm (1000Base-SX) 550m	
		4195098	XFP, TDM, 10Gbps, 1310nm, industrial temp 5/3.3/1.8V - 10 Km	
	Tellabs Voice Gateway (Component 6)	0260-0243	Tellabs 1000 Voice Gateway (Single shelf)	
	Tellabs ONTs (Component 7)	728GP 1.16G-728GP00B-R6	ONT728GP - 24GE with PoE; MDU; 1 RU 19-inch Rack. 100 to 240V AC powered (B power cord)	
		729GP 81.16G-729GP0PB-R6	ONT729GP - 24P, 24GE with PoE; MDU; 1 RU 19-inch Rack. 100 to 240V AC powered (B power cord)	
		120C 81.11G-ONT120C-T-R6 81.11P-ONT120-A-R6	ONT120C 2GE PWR, ONT120, 56V, 30W, TYPE A	
		120W 81.11G-ONT120W-T-R6 81.11P-ONT120-A-R6	ONT120W 2GE PWR, ONT120, 56V, 30W, TYPE A	
140W		140W 0 POTs Ports 0 10/100 Ports 4 10/100/1000 Ports 0 xDSL Ports 0 DS1 4 PoE Ports 0 RF Video 0 RF Return Not Outdoor Hardened		
LEGEND: 1U One Unit AC Alternating Current DSL Digital Subscriber Line EMS Element Management System Gbe Gigabit Ethernet Gbps Gigabits Per Second GGFE Government Furnished Equipment GPON Gigabit Passive Optical Network ONT Optical Network Terminal OLT Optical Line Terminal POE Power Over Ethernet POTS Plain Old Telephone System RF Radio Frequency TDM Time Division Multi-Plexing SFP Small Form Factor Pluggable SP Service Pack V Volts W Watts XPF X-Form Factor Pluggable				

Table 3-4. Test Tools and Infrastructure Hardware/Software/Firmware Version Identification

Test Tools and Infrastructure Components	Software Release	Function
Test Tools		
Ixia XM2 and XGS12	Ixia IxOS_6.80-GA Ixia IxNetwork_7.40.929.28-GA	Traffic Generator with Ethernet 10/100/1000 Mbps and Ethernet 1/10/40/100 Gbps Interfaces
Agilent JDSU T-Berd 8000	6.4	BER Generator
Infrastructure Components		
Cisco 3750X	IOS_12.2(58)SE2	ASLAN-Distribution Switch
Juniper EX4500	JUNOS_12.3R4.6	ASLAN-Distribution Switch
LEGEND: ASLAN Asured Services Local Area Network JUNOS Juniper Network Operating System BER Bit Error Rate Mbps Megabits per second GA General Availability MSPP Multi-Service Provisioning Platform Gbps Gigabit Per Seconds R Release IOS Internetworking Operating System SE Standard Edition Ixia Vendor Name XGS12 Vendor Model Name JDSU Vendor Name XM2 Vendor Model Name		